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The AMERICAN JOURNAL of OPTOMETRY

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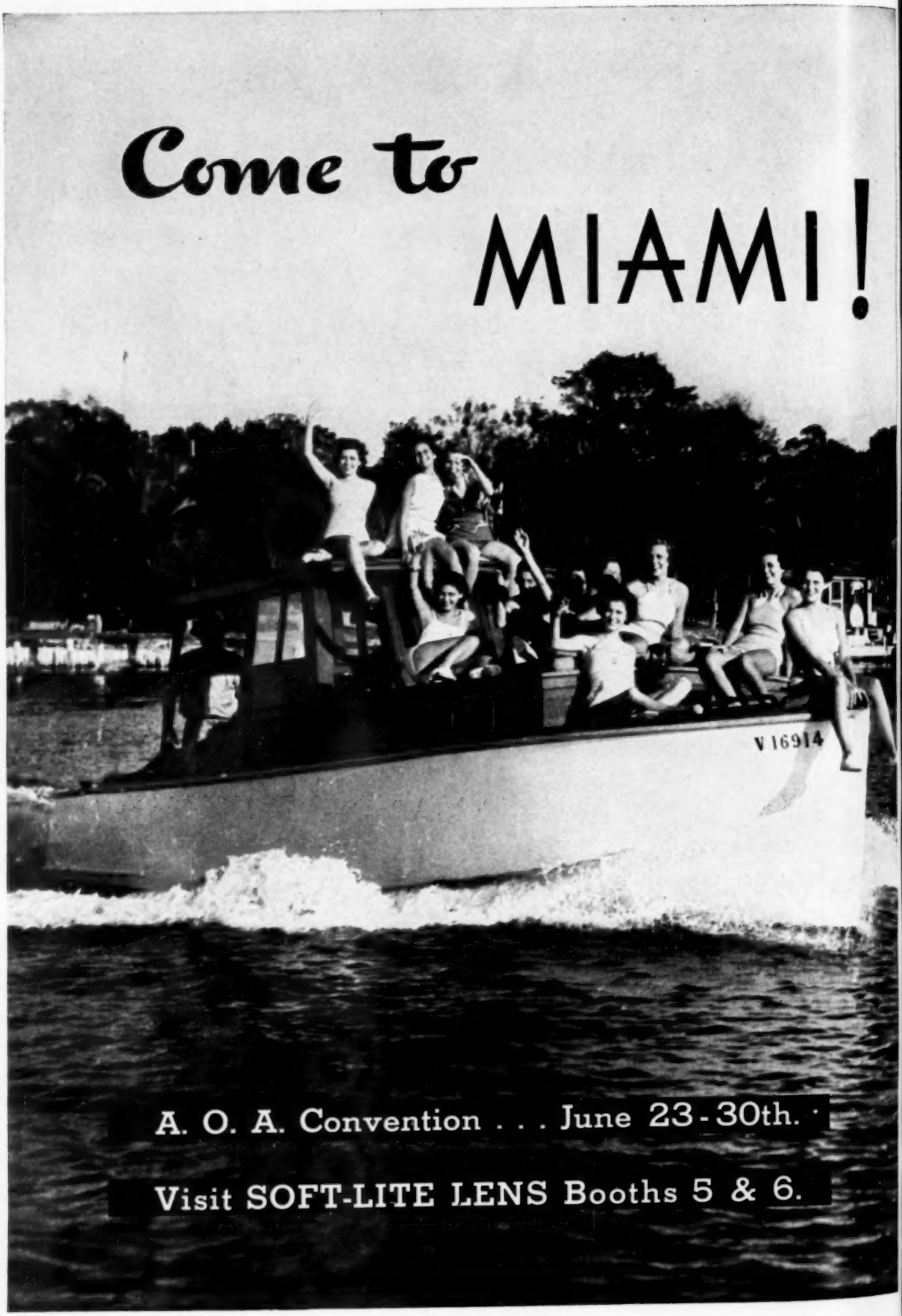

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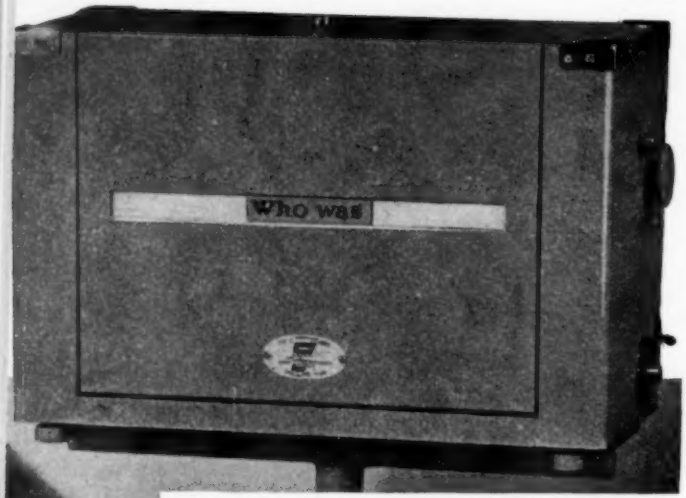

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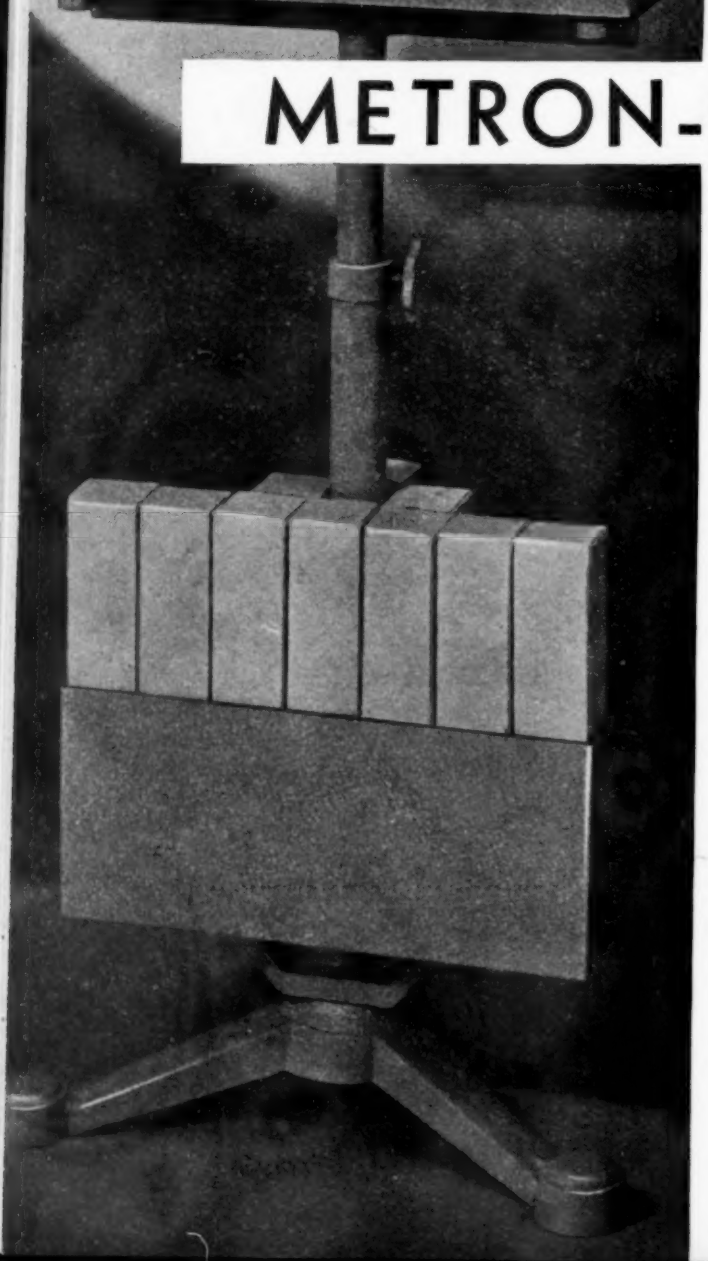


The average school child has to read 15 times more today than in 1900... The college students' reading has increased 5 times in the same period... The amount of reading done by professional and business men has increased proportionately... The number of worth-while publications going into the average home has increased 170%.

Two new instruments – the Ophthalm-O-Graph, for diagnosis – and the Metron-O-Scope, for training–supply the necessary link between present work and a vast new field of service.

The OPHTHALM-O-GRAPH is an eye camera which *records on motion picture film* a binocular photographic record of the movements, fixations, and speed of action of the reading eye. *For the first time, the practitioner may show his patient*

AMERICAN

AMERICAN JOURNAL OF OPTOMETRY

Vol. 12 JUNE, 1935 No. 6

CHROMOGRAPHY*

Donald J. Mayer, Opt.D.
Riverside, California

Chromography as a part of every complete analytical optometric examination gives evidence through which we may aid the patient to full ocular recovery.

Chromography is optometric insurance. Chromographs recorded every six months insure the patient against all incurring toxins and toxic conditions affecting the eyes through lowered resistance. If the chromographs are near the expected norm then most certainly the innervational visual pattern of that individual, for whom the chromographs are made, is not being effected by toxemia of any kind.

Chromographs recorded every six months assure the optometrist that the future state of health of the patient's eyes will be good and the patient will have no reason to have other than straight optometric services in the future. Both patient and optometrist are greatly interested in the future ocular welfare of the patient's eyes and chromographic evidence truly aids the optometrist in being the guardian of his patient's eyes.

Among medical men, "a patch up job" is universally known as any form of medical or surgical attention that will not alleviate the ailment or trouble, but will give relief for the immediate time. In opometry we have a great many men doing "patch up work," or giving optometric attention of value and many times of very doubtful value only for the time being, never thinking of the future ocular welfare of the patient. When we do a "patch up job" we are not building good future optometry any more than we are good guardians of our patients' future ocular welfare.

The optometrist receiving a case immediately assumes (as does the good medico) that his services are to be absolutely satisfactory, so that he may give any needed optometrical service to this patient in the future and that he may take care of the patient's family, and through reference, friends and acquaintances. If he is a conscientious optometrist he does not think otherwise (likewise the good medico), if he is not so good he may do "patch up work" and his practice will suffer.

*Submitted for publication May 17, 1935.

The line of demarcation between an abnormal physiological function and a condition of pathosis is indeed slight. As Skeffington says, "We do not diagnose patholgoy, we recognize pathology." The chromographs tell us that the patient's resistance is high and that he is combating any toxemia that may exist in his body, or that his resistance is low and toxemia can no longer be taken care of and that it may be an actual pathosis, or may become so if not taken care of immediately.

The chromographs go further and by careful follow through work tell us to whom we should refer the patient for attention other than optometric, and by the follow through work, the graphs are made until recovery is reached. In this manner the case is under complete optometric control at all times.

Chromography is only a part of an analytical optometric examination, but is an indispensable diagnostic aid to our profession.

The following case would have been released with the prscription made in bifocals and the patient would have had ocular comfort, but during a period of time covering two years a great deal of damage would have been caused, ending in partial destruction of the retinal tissue. Without chromography as a diagnostic aid this would have been a typical "patch up job."

Patient Mrs. G. O. B., age 58. History: Difficulty in reading of late, hard to thread needle. After reading ten or fifteen minutes letters run together. For past year has not had comfortable near vision, gradually becoming more difficult to do near work. Other than house work uses eyes in reading or sewing about four hours daily. Health has always been excellent.

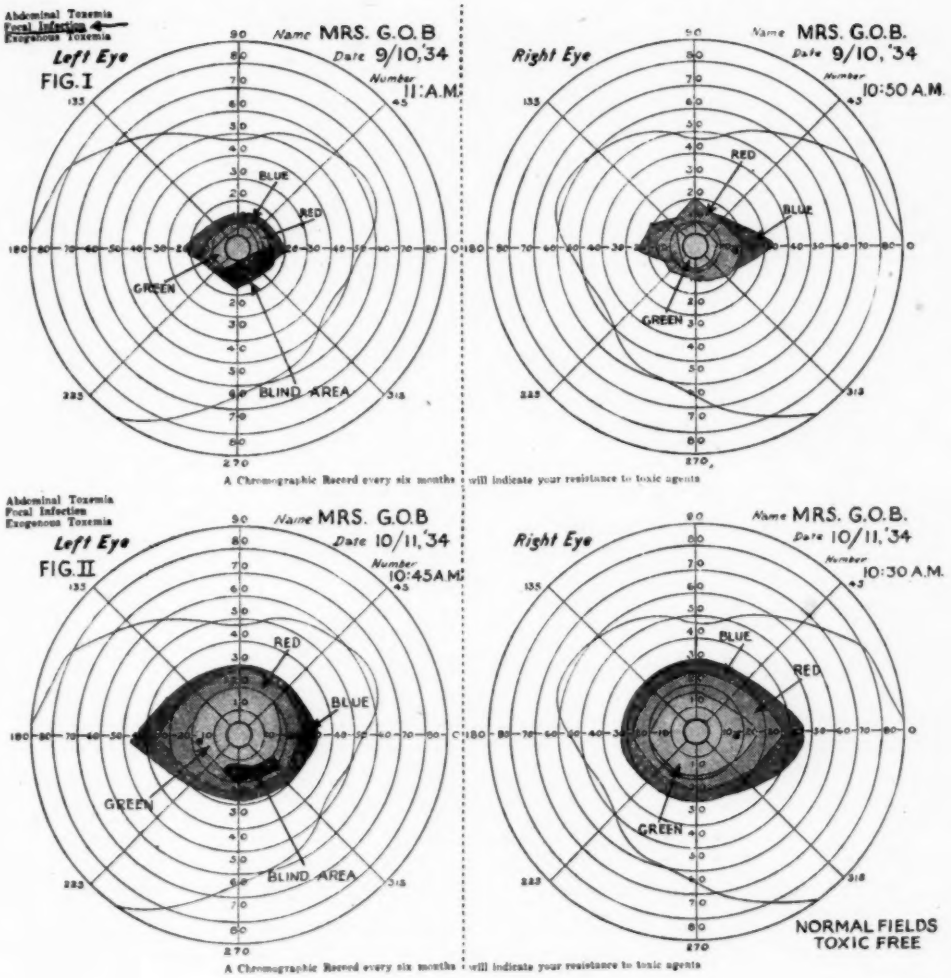
The extra ocular tests show normal blood pressure, sinuses clear by trans-illumination, teeth need attention and mouth is affected by pyorrhea, but not appearing as a bad case, throat clear and normal. External ocular examination normal.

Following the twenty-one point examination of the foundation with a number of added tests, nothing was found or recorded showing a toxic interference. The case proved to be a simple B2 type case calling for a bifocal correction.

Chromographs made at 11:00 A. M. and again at 4:30 P. M. revealed a severe focal infection. The graph of the right eye (Fig. 1, Mrs. G. O. B.), showed the green field well within the ten degree circle; the red field up 20°, down about 15° and the lateral measurements about 16° and 20°, only a part of the blue field was without the red field and that was laterally.

The graph of the left eye revealed greatly constricted blue, red, and green fields with a large negative blind area as recorded.

In view of the history of excellent health and further because of the extra ocular examination showing needed dental attention, Mrs. B.



was referred to the oral surgeon for full mouth X-Ray and dental diagnosis.

As I have stated in a previous paper, 80% of all focal infection is found in the head (Hayden, Rosenow, and Lucas) and a much greater percentage than 80% of all patients over thirty-five years of age showing foci of infection by chromography have some form of dental pathosis or oral infection as the main contributing cause of the infection, therefore, it was obvious that this patient was referred to the oral surgeon.

The report of the diagnosis and the dental surgery completed by Dr. Housholder is here shown.

October 8, 1934.

Dr. Donald Mayer,
Citizens Bank Bldg.,
Riverside, California.
Dear Doctor Mayer:

Concerning Mrs. Boosey:

X-Ray examination discloses horizontal reversed impaction of upper left third molar. Upper right second bicuspid and first molar are non-vital. Upper right second molar is missing and alveolar process greatly absorbed, leaving a food trap between first and third molars. Lower left first and second molar edentulous with evidence of residual area in the bone.

The case was operated as follows:

Removal of impacted third molar. Surgical removal of upper right second bicuspid and molar and areas curretted. Upon opening the edentulous area of the lower left first and second molars a large cyst was found and removed and area thoroughly curretted. The incision was then closed with black silk sutures. The lower left second bicuspid, which had decayed to the point of pulp exposure, was also removed.

All remaining teeth proved vital under Cameron's galvanic test.

Sincerely yours,
F. L. HOUSHOLDER, D.D.S.

A series of chromographs were made upon completion of this dental oral surgery following the case through to complete recovery. The graphs made when I released Mrs. B. from my immediate care one month later revealed normal color fields (Mrs. G. O. B., Fig. 2), and the blind area smaller and farther away from central vision. That this scotoma definitely is somewhat more narrow in width and farther toward the periphery of the chromograph was recorded a number of times as the graphs were made after Dr. Housholder completed his work.

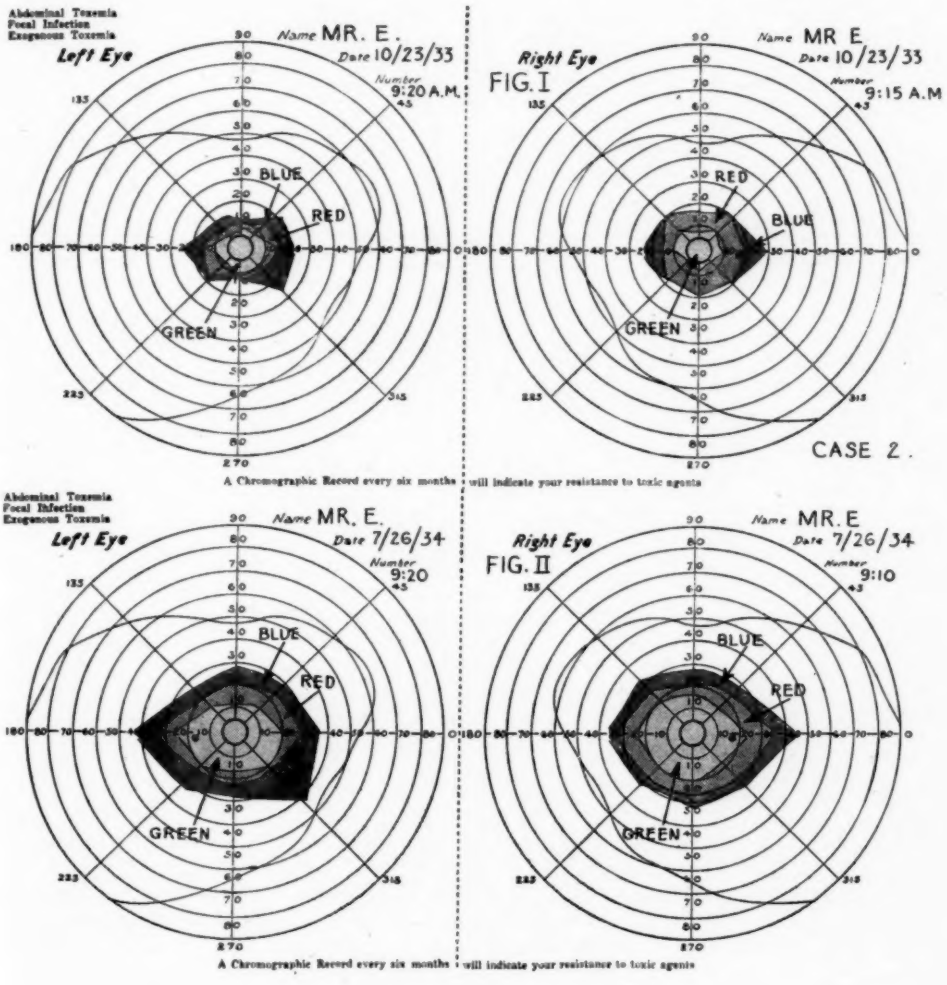
Now Mrs. B. will enjoy good comfortable vision and can feel assured that no toxemia present in her system is affecting her eyes, and that no further damage will be done to that delicate part of the eye that records vision. She understands that a chromographic record every six months will indicate her resistance to toxic agents.

In October of 1933, a civil engineer was referred to me for optometric attention by a dentist. The case follows: Mr. E., age 50. History: Reads technical papers and studies about eight hours daily, finds that print blurs and can not see well at distance with glasses which were prescribed by an oculist one year before coming to me. The glasses, single vision lenses, were to be worn all the time. Eyes inflamed (both ocular and palpebral conjunctiva) most of the time, right eye generally worse.

Mr. E. had had this inflammation of the conjunctiva ever since completing some engineering work in Colombia in 1920. He had been to many well known medical eye men, but no form of localized eye treatment had ever helped him.

The extra ocular tests were normal. The patient wore full dental plates (this work had just been completed about seven months before coming to me), sinuses clear, throat normal, blood pressure normal. The balance of the examination showed the habitual phoria and the induced phorias high, high exo at infinity, but all ductions extremely low. The patient needed bifocal lenses and the physiological diagnosis showed toxic interference.

The chromographs revealed a focal infection type of graph (Mr. E., Fig. 1), and because the dental diagnosis was negative by full mouth X-Ray and the throat and sinuses appeared normal, Mr. E. was referred to a good general medical diagnostician who is an abdominal specialist.



Intestinal ameba were found and the patient was treated for this amebic infection for several months. In July of 1934, Mr. E. came in for check examination, including chromographs. The chromographic examination (Mr. E., Fig. 2), showed normal color fields and a tolerance to any remaining toxic disturbance. The conjunctiva were quite normal, and the patient said his eyes were less blood shot than they had been for fourteen years. The muscle balance and tonicity were much better, and Mr. E. had comfortable vision both for distance and near work.

Let us remember there is no primary ocular disease; any and all localized eye treatment of a medical nature is "patch up work," until and unless the source of the disturbance is removed.

Due to the fact that this patient had been treated by a number of medical men (all of whom enjoy splendid reputations) and had not been helped by them, any optometrist not doing chromographic work might have released this patient with new glasses and no further suggestion of professional attention to clear up the inflammation.

Here again chromography as a diagnostic aid, or a part of an analytical optometric examination was of a great value, and the normal chromographs assured the patient an expected period of eye comfort and good resistance toward toxic agents affecting the health of the eye.

On January 2, 1935, Mr. H., age 60, was referred to me by a very competent osteopathic physician and surgeon.

That this patient had had a definite pathosis was evidenced by the case history. History: Some eight years ago the right eye failed and the optic nerve atrophied. The left eye is becoming dim, misty and sees as in a heavy fog or cloud. Health not good, stomach bad and has no nerve now, because cannot see to walk well.

Several medical men had made diagnoses of optic nerve atrophy, but all said there was no treatment available. Optometrists had changed his lenses but had made no suggestions of further attention of any kind.

By examination, I found the right eye blind and the left eye failing rapidly. Mr. H. had 60% visual efficiency with the left eye. He required a plus .50 cylinder at 180 with an additional plus 2.25 sphere for reading. This prescription was slightly different than the glasses being worn but gave no improvement in vision.

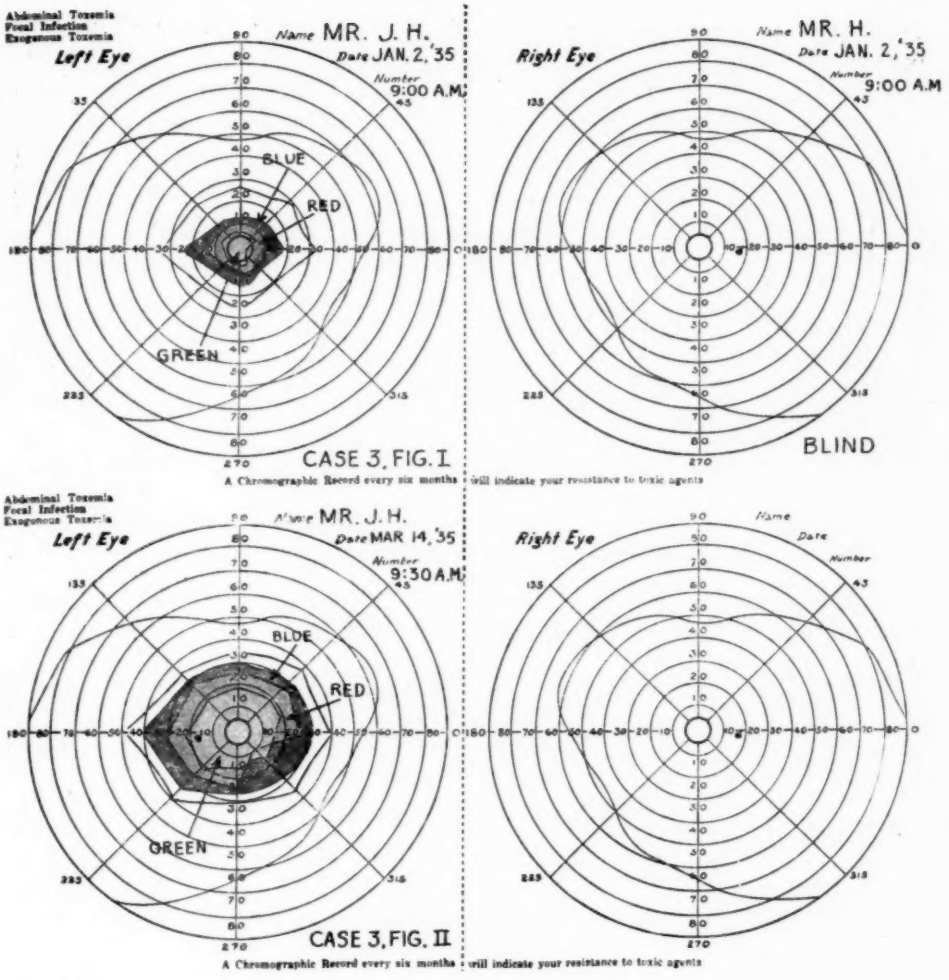
The chromographic examination (Case 3, Fig. 1, Mr. H.), revealed focal infection and as the extra ocular tests had all been negative with the exception of much needed dental attention. Mr. H. was referred to the oral surgeon for complete oral diagnosis.

The report of Dr. Housholder's diagnosis and surgery follows:

Dr. D. J. Mayer,
Riverside, California.

Re: Mr. Hamner:

The X-Ray shows that on the upper left third molar there is a peridental abscess involving all roots; the upper right second biscuspid is nonvital with an apical involvement; the upper right third molar has an en-



cysted root tip from a previous extraction. The lower left second and third molars have peridental abscesses; the lower right second molar is malposed, creating a food trap and causing destruction of the supporting tissue. All the teeth show a great deal of pyorrhea involvement although the supporting bony structure is of good texture.

The case was operated as follows: The upper right first molar, upper left second bicuspid, upper left third molar root tip, lower right second and third molars, and the lower left second molar were removed and the sockets of all thoroughly cureted. The balance of the teeth were thoroughly cleaned and polished and the gums treated by massage.

DR. F. L. HOUSHOLDER, D.D.S.

Two months after this dental oral work was completed, the chromographs were again recorded (Case 3, Fig 2), and the graphs found normal and toxic free. The peculiar "dip" in the red field in the lower

nasal quadrant still prevailed, but all of the color fields were near the expected norm. It is to be noted that the blue field of the second chromograph is larger than the form field of the first chromograph. At times the patient's vision was better, but the mist or fog never lifted.

At this time syntonic applications and some orthoptic training were instituted, and at the end of a month's care of this kind, the Ives acuity readings gave a very definite improvement in vision of 30%. All of the mist and fog had cleared or lifted and the patient felt better physically than he had for a long time.

The second month of corrective training and syntonic applications of the same nature was completed and examination revealed 100% vision of the left eye, all former visual difficulties alleviated, and the patient showing a degree of physical and mental tone he had not had for a number of years. The chromographs were almost a duplicate of the second set of graphs recorded which are normal.

The case was an ordinary "patch up job" both by the medicos and the men of my profession. Had chromographic examination been included in the optometric examinations, three of which had been made within the past four years, evidence of foci of infection, followed by the proper oral attention, very likely would have kept this left eye from giving any trouble at all.

The case has been dismissed from my immediate care with instructions to report in four months for check examination. To this patient chromography proved to be optometric insurance, and he knows that as long as the chromographs are near the expected norm there can be no infection in his body that he cannot resist and, therefore, he expects, and righly so, that his vision will not collapse again. Mr. H. has been told that should there be a change in his vision, orthoptic and syntonic optometry of a stimulating nature will again improve his vision and, therefore, the old fear of blindness has disappeared.

During the corrective work it was emphasized that the relaxation and stimulation given was optometric care and in no way resembled medical treatment.

Follow through work in chromography definitely proves that the removal of oral infection in patients over thirty-five years of age raises resistance to a point of tolerance in the great majority of cases of foci of infection, and that sinus infection is secondary to oral infection is being proved. Another patch up case showing this follows:

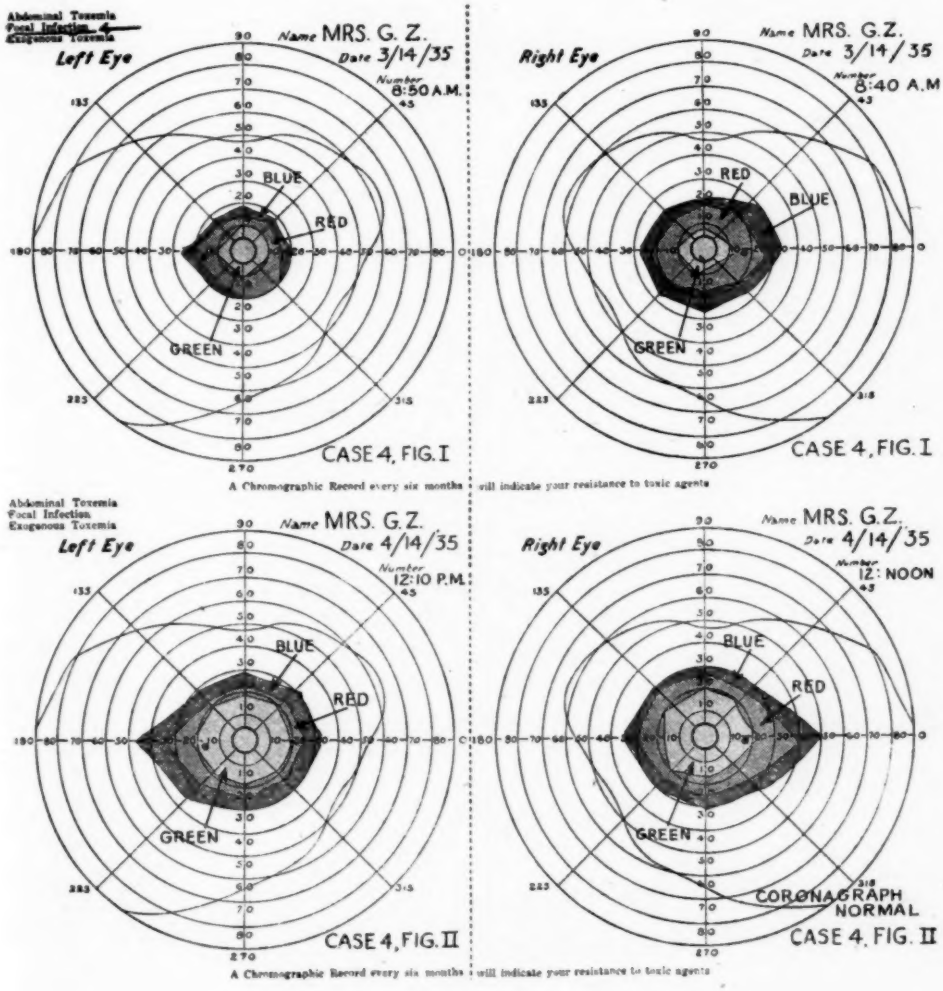
On March 10, 1934, Mrs. G. Z., age 35, was referred to me for optometric care. Case history: The patient had been under the care of a number of medical practitioners for the past five years. She was subject to colds, having six or eight severe colds every year. Had had maxillary sinus trouble for three years and has these sinuses washed out three or four times a year, also subject to sore throat. Eyes seem weary all the time, and sees angle worm spots before her eyes most of the time. After

retiring at night sees lights in front of eyes for some time, thereby affecting sleep. Difficulty in looking down to go down steps and then seems to notice a film in front of right eye.

Mrs. Z. had been under the care of two medical eye men and was referred to them by an optometrist. Therefore, the Opto was the first patch-up artist.

Analytical examination showed a C1 type of case calling for more than the lens prescription given. Several pair of glasses had been prescribed, but no further ocular attention had been given or suggested.

The chromographs (Case 4, Fig. 1), shows marked foci of infection. Extra ocular examination revealed fairly clear sinuses, a low



grade inflammation of the right side of throat, normal blood pressure, and a mouth needing prophylaxis. Mrs. Z. was referred to a very thorough and competent dentist for examination and dental attention.

Dr. Stevenson's report of examination and dental care follows:

April 4, 1934.

Re: Mrs. Gladys Zook.

X-Rays of Mrs. Zook show a slight pyorrhea condition throughout the mouth, with a very definite condition around the upper left molar area.

The lower right second molar showed a great amount of decay underneath the filling which forms direct communication with pulp chambers. After extraction the tooth was found to have chronic pulpitis. Upper right first bicuspid has been extracted and shows residual area.

I believe the main source of infection at this time is the lower right second molar, which has been extracted.

D. R. STEVENSON.

Immediately following this dental work orthoptics were given by the Arneson and Updegrave techniques. One month later the chromographs (Case 4, Fig. 2), were recorded and found to be normal. Re-examination of the eyes showed a visual graph quite normal.

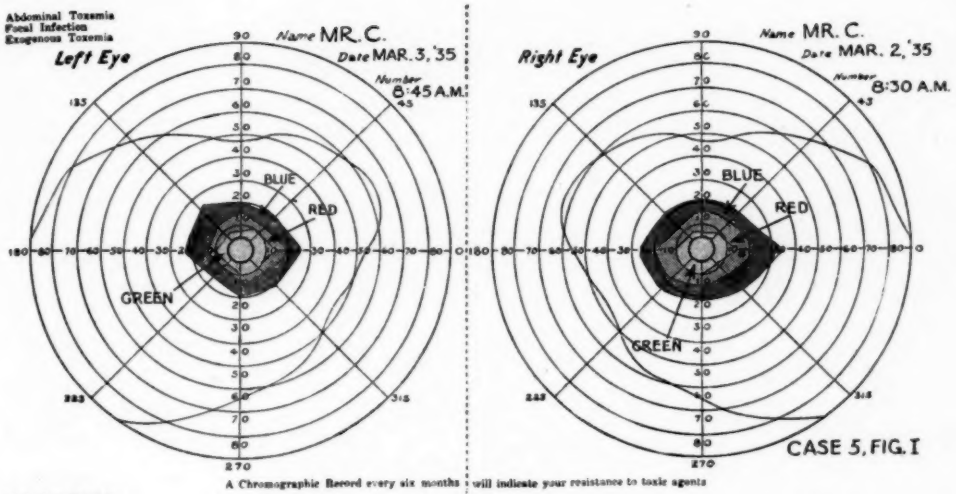
The patient was informed that check examination of the eyes every four months was advisable and chromographs recorded every six months would give a positive index of her resistance to toxic agents and the chromographs being normal, no toxemia or infection would be a contributing cause to ocular disturbance.

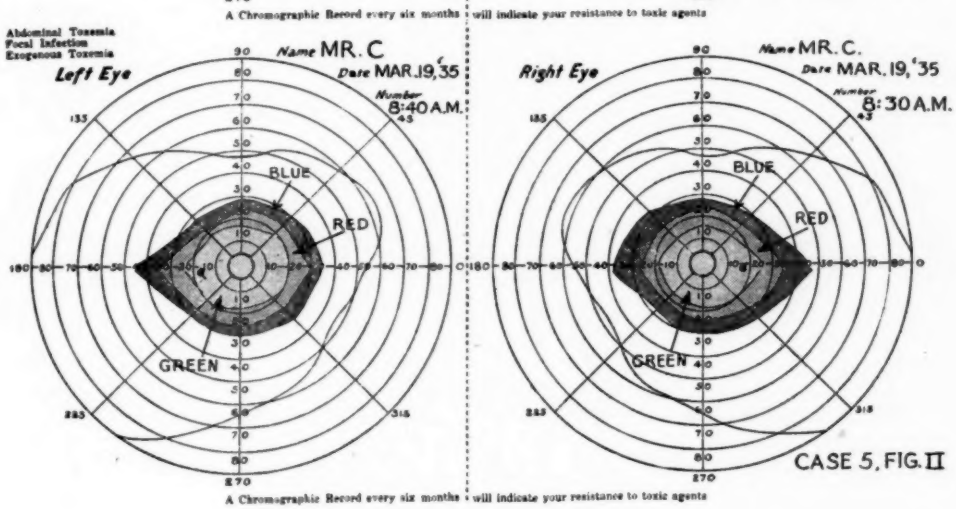
The chromographs recorded six months later were normal, and on April 16, 1935, when complete optometric examination was given the chromographs were still normal and very much the same as the second graph here shown (Case 4, Fig. 2).

Over a year's time there has been absolutely no indication of recurrence of sinus trouble, and the throat seldom is sore. The eyes are again beginning to show fatigue and some muscae volitantes. Syntonics and orthoptics have been instituted and satisfactory results are being obtained.

On March 1, 1935, Mr. C., age 47, was referred to me for complete optometric diagnosis by a surgical nurse who recognized the fallacious manner in which this man's eyes had been examined and treated. Mr. C. had received ocular attention from a number of practitioners located in various parts of the state. Several forms of medical therapeutics had been administered over a period of three years, and glasses in single vision and bifocal forms had been prescribed, all with no benefit to the patient.

Mr. C. was bothered by lachrymation and burning of the eyes when near work was attempted and, in addition, suffered from photophobia when out doors. In his work, that of a surgical supply salesman, he drives a large part of the time and with these ocular difficulties has very little comfort during his waking hours.





Optometric diagnosis other than chromography gave evidence that a near point correction in lenses and orthoptics was all that was required, although he had always been given minus lenses for distance vision.

Chromography revealed foci of infection (Case 5, Fig. 1), and the patient was referred to the oral surgeon for examination and attention. The report of Dr. Housholder follows:

Dr. D. J. Mayer,
Riverside, California.

Re: Mr. Cowells

X-Ray shows lower left first molar with gold crown and extensive rarified area involving both roots.

Lower left first molar was extracted, area thoroughly cureted and socket closed with sutures.

F. L. HOUSHOLDER, D.D.S.

Two weeks after the completion of oral work, the chromographs showed the eyes to be toxic free and the graphs normal (Case 5, Fig. 2). Reading glasses have been prescribed, syntonic applications and orthoptics are being given and the patient is responding very well. Only occasionally do the original symptoms give any disturbance, and the visual graphs are greatly improved. A glare prescription will be given at the finish of the orthoptic training.

In the January, 1935, issue of the American Journal of Optometry, George A. Morgan, D.D.S., has a very much worth-while paper, "Dental Examination in Ocular Disorders." Dr. Morgan has pointed out a definite hook-up between ocular disorders, pathosis and oral infection.

Chromography gives a positive diagnosis of foci of infection long before there is pathosis of the eye. As stated before, the chromographs don't lie. When several sets of graphs give the same type of reading, it is known with exactness that this determined infection is contributing to any existing ocular disturbance and immediate attention is demanded. When this attention is given, we prevent patch up work in later years. Waiting for the production of ocular lesions and then removing foci of infection is indeed work for the patch-up artist.

Dr. Housholder and I have had a patient under close observation for five and one-half years. Originally in optometric diagnosis, chromography revealed focal infection. The removal of oral infection raised resistance to normalcy. After lenticular prescription and orthoptics, the patient was released from immediate attention but follow through work in chromography was recorded every six months. For a period of three and one-half years, during which time the lenticular prescription was changed the chromographs show normal fields and good resistance.

At the end of these three and one-half years, the *Flu* caused a gradual change and collapse of the chromographs resulting again in the focal infection graph. Six months ago, oral infection was again diagnosed. A part of this necessary dental surgery has been completed with subsequent improvement in the chromographs, visual graphs, and ocular symptoms. The oral surgery and follow through work in chromography is not complete, so charts are not included in this paper.

Early in February of this year, a young woman, twenty-three years of age, was referred to me for optometric care. This patient had just finished her education and training as a missionary and was ready to go out into the missionary field in a foreign country. The board of medical examiners had pronounced her physically fit for field work. They had told her that her eyes were causing no trouble and needed no attention.

Because of a lack of desire to do some necessary near work, a condition she had never had before, for she liked to study, some friends sent her to me.

Optometric diagnosis revealed a C1 type of case with a chain of toxic interference. Chromography showed foci of infection. The patient was referred to the oral surgeon and two impacted third molars and a non-vital cuspid were removed. The chromographs showed an improvement but still revealed a lack of resistance. Another complete medical examination at my insistence resulted in a tonsillectomy.

Two weeks after the tonsillectomy chromography revealed normal graphs and good resistance. Orthoptics completed this case and now the patient is assured of eye comfort and safe in the knowledge that the foci of infection which would have continued to contribute to ocular discomfort, with the end result of ocular pathosis or a physical "crack up" has been alleviated.

This patient has a history of poor health throughout her life. She seems a poor risk for foreign service and yet the medical board had pronounced her fit. I feel that her chances of health are greatly increased and her visual pattern is normal, so she has been released as a completed case and not a "patch up job."

Conclusion

The story of chromography as insurance to both the patient and the optometrist goes on indefinitely, and as a necessity in the prevention of patch up work, it must be included in complete optometric diagnosis.

Clinical record following clinical record is diagnosed without a chain of toxic interference; case after case is analyzed and appears to require only a lenticular prescription or a lenticular prescription and orthoptics, only to be found by chromography to require additional attention and care to actually be completed.

Because of its value in follow through work, chromography is a real aid in preventative and corrective optometry as well as the original optometric diagnosis.

The fact that chromographic evidence is based on thousands of case records of optometrists in individual practice, plus a great many thousands of case records of some of our large optometric educational clinics, it insures the practitioner facts and information upon which complete recovery can be brought about.

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A BASIC TECHNIQUE IN ORTHOPTICS*

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The sum total of any optometric examination, regardless of the number and kinds of tests made, is in the subjective examination and the subsequent prescription. We assume that the optometrist has thoroughly investigated the status of the patient's eyes and has, by an analysis of the various data, arrived at the conclusion that muscle training would be efficacious. The next step then, is to map out a definite program and a tentative method of procedure. The program must be definite because, if the diagnosis has been made, there can be only one program of handling a particular case. The method of procedure may be tentative, as the method may often be changed in order to produce more satisfactory results. The same modus of operation may not work out as effectively in one case as it does in another similar one. But still such procedure should not affect the program as outlined. The program in orthoptics is analogous to the blueprint. In its formulation the entire case history and all the data derived from the various tests are given consideration. Based on this information is a method of operation: first, a basic, or underlying technique; and then supplementary techniques, if, and when such are indicated or even suggested.

The basic technique in orthoptics is a definite procedure; just as the alphabet is the basis for written language. Whatever other modes and methods of training may be advisable, they are independent of the fundamental technique. The basic technique lays the foundation upon which the orthoptist builds or reconditions a pair of eyes and faulty eye muscles. But the underlying system of approach, the foundation, as it were, is the same, regardless of what the case may require at a later time. In refraction there is a basic modus operandi which leads to the final analysis and prescription. And although the prescription may vary in the individual case, the method of approach is essentially the same, nevertheless. In muscle work the same principles apply. The tests which lead to the determination of the various conditions are essentially similar, although the results may be diverse. In training muscular anomalies the methods

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employed are fundamentally similar, although their application may be diversely different. In consideration of all these facts, a basic technique in the practice of orthoptics should not be difficult to conceive. Such a technique will serve a practical purpose inasmuch as it will provide a definite basis for the training of the ocular muscles and for the development of amblyopic eyes.

A brief review of the anatomy and physiology of the ocular muscles is in place at this time, for the purpose of refreshing the memories and for the better understanding of the subject. There are in all six muscles in each eye which provide version and rotation to the organ. The superior rectus, supplied by the upper division of the third cranial nerve, rotates the eye upwards and inwards; the inferior rectus, supplied by the lower division of the third cranial nerve, rotates the eye downwards and inwards; the internal rectus, supplied by the lower division of the third cranial nerve, rotates the eye inwards; the external rectus, supplied by the sixth cranial nerve, rotates the eye outwards; the superior oblique, supplied by the fourth cranial nerve, rotates the eye downwards and outwards, and the inferior oblique, supplied by the lower division of the third cranial nerve, rotates the eye upwards and outwards. Anatomical, physiological and psychic reactions and abnormalities may cause temporary and even permanent maladjustment in these muscles, consequently creating either a phoria or a tropia. The etiological factors, which may be pathological and innervational, in addition to the ones mentioned, are of not too great value insofar as this thesis is concerned and shall be passed over lightly. However, it suffices to mention, in passing, that the psychic element occupies a place of great importance in the corrective procedure and shall be discussed more fully at the proper time.

In the corrective procedure of myological maladjustments, elementary knowledge of muscular apparatus is taken for granted. It is likewise assumed that knowledge of the various tests, preliminary to the determination of the existing condition, are also thoroughly familiar with, and so, this phase of the work requires no repetition here. Nearly every optometrist who is interested in orthoptics, has his own bag of tricks for the determination of existing abnormalities, for which there are, in addition, standard tests. Moreover, there are exceptional cases which require investigation aside from the accepted methods of procedure. Some of these tests will be considered in these pages, and whenever possible, tests will be outlined for the determination of the types of cases which may be classed as unusual. The same consideration will be accorded to the treatment of the various muscular anomalies.

Phorias and tropias are the two main classifications in muscular abnormalities. The first type is a manifestation, warning, or indication that there is undue straining and undue abuse of the muscles which rotate the eyes. This explanation, of course, is generally applied. A phoria is a tendency to deviate. Not all phorias come under this classification. Phorias physiologically speaking, indicate muscle tone, and observation

leads us to believe that they indicate the tone of the vital organ muscles in addition to those of the eyes. A phoria typical of overexerted eye muscles must be differentiated from that produced by overcorrection, toxemia, hypertension and other pathological manifestations. There are numerous tests for the differentiation of these discrepancies and should be applied before actual diagnosis is made.

Tropias indicate definite abnormality. Because of some existing condition, one eye, or both, fail to perform in unison, the act of binocular vision. Because of this, the finer elements of vision, such as fusion, stereopsis, are absent, and each eye, if capable of good vision, is a distinctly separate organ. There is no correlation of function between the two eyes. It frequently happens that the visual powers of the two eyes are dissimilar, but whether the tropia is caused by that factor alone, or whether other elements enter into the causative history is a question. We are all familiar with cases of anisometropia and antimetropia of marked degree and variation and which show perfectly normal extrinisic muscle balance. What really causes strabismus in one case and leaves no impression on a similar other case is yet to be learned. The causes attributed are: anatomical, physiological, optical and psychic. The extrinsic muscle or muscles may be out of proportion; they may be over or under-innervated; there may be undue exertion between the functions of accommodation and convergence, or there may be some psychic reaction, either emotional, hysteria, fright, maladjustment of the two visual images in the visual centers of the brain, which results in suspension or suppression of one image. In all these cases one manifestation, the absence of fusion, makes itself apparent. This leads to the deviation of one or both eyes and to the condition known as strabismus. Amblyopia ex-Anopsia and absence of fusion are the results rather than the causative factors.

Whether it is a Phoria or a Tropia, certain factors must be taken into consideration when making the diagnosis and in mapping out the program of training. It must be borne in mind that the human eye and the entire visual apparatus is not a fixed mechanical object but a highly flexible living organ which is affected by pschological, physiological, bacterial, toxic and other reactions. Its innervations and inhibitions come under the control of the brain and nervous system. Emotions play a considerable part in affecting changes in an otherwise normal visual hookup. The psychic element in the act of vision is now recognized to play a highly important part. The psychic element in the act of visual co-ordination is elastic and permits of stretching and of shrinking. It is erroneous to try to adapt the innervational and the inhibitive forces which control the visual act to a prescribed formula or to a given set of numerical values. While we recognize the existence of certain norma, or expecteds, we have known instances in which persons appeared quite comfortable with conditions which were, according to accepted mode of reasoning, to have been quite uncomfortable. The set of normals and expecteds in the inhibitive and innervational apparatus of vision may

be theoretically in accordance with the logical conclusions which led to their adaptation, but in practical use their value is questionable. Innervation and inhibition take into account numerous psychic, endocrine, physical and physiological factors, and possibly factors which are still unfamiliar to science. Psychology and psychiatry have yet a lot to learn about the various neurosis types and their effects on the general physical condition and the eyes.

Having determined that orthoptics and orthoptic training are indicated and that no matter how accurately the eyes are examined, no greater relief could be obtained with lenses alone, the next step is to prepare the case for the treatment room. Several tests are indicated and must be made before determining the type of training and in what sequence it is to be administered. It matters not what type of instruments are being used. The instruments on the market at the present time have the same extent of usfulness and any one may be used successfully for the same type of case. There are in main two types of apparatus in the field of orthoptics. One, the prism type, which is either the phorometer, refractor, phoroptor, ski-optometer, kratometer, and other instruments in which prisms, either the rotary or the fixed type, effect dissociation, and also serve as means for calisthenics; the second, the new types of instruments, some of which have proven quite efficient, react on the muscles in a psychological manner. Thus it may be possible to develop any form of muscular imbalance by use of either method of instrumentation. Of couse, greater variety and more efficiency is possible by the use of the two types in conjunction.

When we speak of muscular anomalies, we have in mind the two main types, the heterophorias and the heterotropias. In both types one common condition, amblyopia-ex-anopsia, may be prevalent. In the heterophorias fusion may exist in varied degrees, although there are discomforts and possible diplopia. The degree of discomfort is proportional to the state of the affected muscles. In the tropias, fusion is absent; there is generally no discomfort. All the signs are external. In determining the modes of treatment to administer in the two types, common sense rule predominates. In the phorias visual acuity tests are generally followed by tests in the fusion faculty, the grade and level of stereopsis, macular fusion, both at distance and near, and tests for suppression and suspension. Tropias should be measured for visual acuity in each eye and classification made of the type, approximate amount and if uncomplicated. Periodic squints may show some desire for fusion. Alternating strabismus may be true or false. To differentiate them calls for observation, oftentimes over a period of several tests. The false alternating squint very often responds to training and becomes a monocular squint. The true type is not so successfully handled. The false alternating squint which is made monocular, frequently responds to calisthenics and becomes straight. The true alternating squint remains alternating despite calisthenics or lenses. Scattered reports of successful conclusions in cases of

alternating strabismus appear from time to time, but as for most parts the reports are not discussed in full and much is left out from both the case histories and from the methods employed to bring about amelioration, that very little credence can be given to them. True alternation is a congenital deficiency. Whether it is due to disproportion in the sizes and shapes of the retinal images, causing the eyes to alternate in order not to suffer confusion; or whether it is due to an anatomical disproportion of the recti muscles, or whatever is the real cause for the alternation, is yet to be learned. In alternating strabismus, the visual acuity in the two eyes is generally the same, and usually fairly good, thus allowing each eye to be used independently of the other. Amblyopia-ex-anopsia is not associated with alternating strabismus.

Amblyopia-ex-anopsia, if a true condition, very often responds to treatment by well directed and persistent training. There are several methods by which this condition may be corrected and each orthoptist has a number of his own pet tricks and methods which have proven quite successful. It has been our technique in treating amblyopia to employ the method following, with possible variations, depending on the degree of the condition.

Retinal stimulation, generally indicated in high amblyopia-ex-anopsia, is the first step in the correction of the anomaly. A flasher which switches the light on and off at one second intervals is used and the light is directed into the poorer eye, the better one being occluded. Experience has shown us that over exposure to this sort of stimulation is harmful and so we limit the time to between three to five minutes to the poorer eye and no more than two minutes to the two eyes together. There are several variations to the application of the flashing treatment. The use of a colored lens, either red or blue, helps retinal stimulation. The colored blank is usually placed in front of the poorer eye. The patient is wearing optical correction; if such is indicated, and the colored blank inserted over the correction of the amblyopic eye. The better eye is occluded and the flashing is commenced. Care must be taken when giving these flashing exercises to focus the light so that it would fall on the corneal surface which would correspond with the macular area in the retina. The light flashing exercise accomplishes three objectives at the same time. It exercises the iris, it stimulates the retina and it develops macular fixation.

Another method for macular stimulation and development and one which requires no instruments of any sort is to have the patient—with better eye occluded—mark circles around letters in a newspaper column. The type selected is usually the smallest which the patient can see clearly with the poorer eye. He is instructed to pick out individual letters, such as "a" or "h" or "e" and so forth, and to put circles around each one. This is a tedious task and is not very much in favor, but as it is a very valuable method for the development of macular fixation, it should be encouraged and advised. We find it a valuable home treatment and usually have the patient bring along the "home" work at the next

visit. To vary this work, we have the patient read small print with the poorer eye, both at home and at the office. Frequently a whole training period is devoted just to this work. With macular fixation established and the retina ready to respond to more intricate calisthenics, we usually proceed to the next step, that of coordination of hand and eye.

Not all amblyopic cases require retinal stimulation and macular fixation exercises. Low amblyopias seldom require such a regimen. Frequently, beneficial results may be obtained by merely occluding the better eye, either with a frosted blank or with an eye patch. The occluding disc may be worn over a stated period of time, either at one consecutive time or during short intervals. It is highly advisable to give retinal training, either with the reading chart or circling, even during the period of occlusion. A modified method of retinal stimulation and macular and peri-macular fixation consists of placing a Snellen chart in the line of vision and have the lamp with the flasher fixed on it. The patient, with the better eye occluded, faces the chart at about twenty inches away and picks out with a pointer, the letters as they are being illuminated. The patient is to be encouraged to pick out as many letters as possible during the brief periods of illumination and to select them on the smallest possible lines. This procedure tends to develop speedy recognition of objects in the visual field in addition to retinal and macular fixation.

There are several instruments for the training of coordination between the hand and the eye. The technique, however, is the same, no matter which instrument is being used. A tracing pad, with the picture in front of the better eye, is placed on the drawing platform of the stereoscope type of instrument used for this work. A separator is placed between the two eyes and a blank piece of paper is placed in front of the poorer eye. If there is some visual perception and projection in the poorer eye, the image seen with the two eyes will appear as if projected on the platform, usually away from its original place. The patient is instructed to trace, not draw, the image as he sees it. Best results are obtained by having the patient trace the picture with the hand corresponding to the poorer eye, but either hand may be used. It is sometimes advisable to place the picture in front of the poorer eye and have it traced on that side. This is another method for developing the retina and doesn't accomplish the task the first method does. It is important to adjust the light so that more of it would fall on the side of the amblyopic eye. Colored crayons and pencils are valuable adjuncts in the hand and eye coordination training. It not only offers variety, but it helps to develop new mental pathways in the act of vision. Cut-outs from the comic strips, drawing pads and picture books are valuable material in training the amblyopic eye to see. A column of newsprint may be substituted for the pads, the patient is asked to read the writing. Only in this instance, it is best to place the printed page on the side of the poorer eye.

Teasing the amblyopic to see is a tremendous undertaking. It is a slow and tedious as well as a complicated process. It must not be forgotten that an amblyopic eye is an eye which has forgotten how to see. In training such an eye every available trick, every method and all resourcefulness at the orthoptist's command must be utilized. Disappointment is not infrequent, especially in the early stages of training, but persistence and perseverence may bring encouraging results. It is best to decide on the technique to be employed and to give it a fair trial. It is good policy to alter the same technique from time to time and thus give the same treatment the semblance of variety. It makes it easier to give to the patient and it is easier on the orthoptist's nerves to vary the program.

Having brought up the vision in an amblyopic eye, the next step is to link the two eyes and teach the new member to become an active partner in the act of vision. Fusion training and the teaching of the visual faculty to recognize depth perception and to appreciate stereopsis is the second part of the orthoptic routine.

Whether one uses prism exercising apparatus or whether it is prism effect producing instrumentation that is being used, makes little difference. The methods and not the instruments are our concern and we firmly believe that it is not the instrument but the methods employed that produce the results. As a matter of fact, ten men using ten different instruments, but using similar techniques will produce, in similar hypothetical type cases, ten similar results. In orthoptics, results depend on the case and on the management of it. Some cases will respond to training, while others will not. Some orthoptists, working under prearranged and studied methods of training, will obtain results where others have failed. Yet there are numerous cases which do not respond to training no matter how they are handled. They are not orthoptic cases from the outset.

Fusion training, like amblyopic training, is a matter requiring patience, perseverence and persistence. Fusion, it must be remembered, is an innate faculty. If it is dormant, it can be awakened. If it is congenitally absent, it may possibly be developed. The eye with amblyopia is taken through a series of trainings to make it see, and the patient whose fusion faculty is not properly functioning must be taken through a similar course.

In treating phorias the muscles exercised depend upon the condition and the type of the defect. The rule in exercising is to place the prisms, or to manipulate the cards producing prism effect, opposite to the position at which prisms would be given in prescription. If prisms base in are prescribed, the treatment prisms are placed base out, and *base out* exercises are given. If base out prisms are prescribed, the exercise prisms would be *base in*. In tropias it is often best to administer both base in and base out alternatingly, as such exercise tends to flex both sets of muscles

and innervates them. Fusion amplitude may be increased by alternately giving base in and base out exercises.

In fusion training, the easiest point of fusion should be the starting point and either base in or base out calisthenics given to increase the amplitude and range of fusion. In tropias the easiest point of fusion is often not being felt unless supplemented with prisms, either base in or out. Such prisms, if indicated, should be used only as long as they help in sustaining fusion and should be decreased as rapidly as possible, later to be discarded altogether.

Teasing an eye to see and teasing a pair of eyes to fuse the objects they see call for a great deal of ingenuity and originality. There are many instruments which are essentially for the purpose of fusion training, but whether they are of the most ingenious construction, or whether it is an ordinary hand stereoscope, the results depend on the methods employed. There is no denying that proper equipment makes for more satisfactory results, but along with proper equipment training is highly essential.

There are numerous cards which may be used with instruments of the stereoscope type. Plates with colored backgrounds seem to be more effective in stimulating fusion. Base out prism effect is produced when the cards are moved towards each other; base in prism effect is produced when the cards are moved away from each other. The best results are obtained with the "split" variety of cards. These help, in addition to developing fusion, also in developing depth perception. Instruments with prisms can use any of the cards which supply concerns stock. Separation is produced by the manipulation of prisms.

In all cases of amblyopia-ex-anopsia, whether there is squint or not, a routine examination of the fusion faculty is advisable. An ordinary "F" "L" chart may be used, or a more elaborate method may be employed. The card is placed in the stereoscope and first one letter is exposed to the patient's view and then the other one. The patient is asked to read off each letter as it becomes visible and then both are shown and he is expected to report an "E" if he has fusion. The speed by which the two letters are fused indicate the state of the fusion faculty. Stereopsis can be determined in a similar manner by using a card which is made up for that purpose. The degree of stereopsis and the type of fusion is recorded, and if these are absent, record is made of it. Absence of fusion calls for an altogether different method of training than would be indicated in a case where fusion is present, albeit it is weak. One calls for primary training; the other calls for strengthening a faculty which is present. In the first case training must be started from the very bottom and the eyes taught how to appreciate the fused image. In the second case the causative factor is taken in hand and by proper methods increased in strength so that the act of fusion becomes easy and comfortable.

Before determining how to treat a case of weak fusion it is necessary to determine the status of the eye muscles, their versions, rotations,

ductions and tonicities. It is also necessary to determine the fusional reserves, both negative and positive. This information, together with complete data on the refractive condition of the eyes, ophthalmoscopic examination and an examination of the visual fields, constitutes the basis upon which the program for orthoptics is to be built. Added to this information is a complete record of the fusion faculty, in which tests were made for the presence or absence of macular fusion, suppression and suspension, and the case management appears quite easy and simple. Macular fusion should be taken both at distance and at the near point. The "F. and L." card referred to, can be utilized for taking this test. In the larger letters appear halves of the letters "X" "Y" and "Z" in reduced size. When there is fusion, these small letters fuse also and by so doing, indicate that the macular area is quite active and fuses easily. This test can be repeated both for distance and near. Using it for distance, or near, the instrument, either a sterescope or a phorometer or a similar instrument may be used. In the former type of instrument it is easy to adjust the card holder for infinity; in the latter type, lenses may be inserted, equal to the distance of the card holder from the eyes. Similar adjustment may have to be made for taking the test at the near point. The compensatory lenses or the position of the card holder will be different, of course. There are cards especially designed for the taking of macular fusion, but in their absence, the card advised may be as efficient, for at best, this test is a qualitative test.

The same card may be used for determining suppression and suspension. The small letters mentioned may fade out and then appear again. This indicates that there is suppression of either the right or the left eye. We classify the two, suppression and suspension, under the same heading, as we believe that suspension is in reality suppression, only of longer duration.

Proper diagnosis and proper classification of the condition is as essential in orthoptic work as it is in refractive work. A definite routine program in handling a specific case is likewise essential, for then the orthoptist knows just what he is to do and will not wander blindly in a helter-skelter manner. Success in orthoptics depends in a large measure upon the resourcefulness and ingenuity of the operator. But success is a two-sided affair, when it pertains to muscle work. As much depends upon the patient as it does upon the orthoptist. Lack of co-operation spells failure for even a 100 per cent successfully assured case. Orthoptics is a two man's job—the orthoptist's and the patient's. That must be made clear at the very start and no case undertaken, unless assurance of full co-operation is secured. That such assurance can best be maintained when the patient sees before his very eyes results of progress, is self-evident. The orthoptist who has his case outlined and keeps a verbatim record, transcribed in detail of each step, each treatment and stating the types of apparatus used, the length of time consumed at each treatment and notation kept of the progress made, has the results of his labors

openly before him. Furthermore, if he keeps his patient posted on what he is doing, it should not be hard for the orthoptist to demonstrate to the patient's parents or other interested parties the actual progress which has been made from the start to the date.

Orthoptics is an intricate, highly scientific piece of work, yet the results of which it is capable, are still unknown. The few men who ventured into this specialty of optometry have contributed a great deal from their experience, success and failures. Only those who are doing this work can really appreciate the exalted feelings which successful conclusion of a case may produce and the disappointment which comes with failure.

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NEGATIVE FUSIONAL CONVERGENCE*
(A Reply to Dr Hammond S. Horton's Recent Criticism)

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The writer wishes to take issue with several statements made by Dr. Hammond Horton in a recent paper[1] in this Journal, which have sufficient importance to warrant answering in view of the fact that they are erroneous and indicative of an unsound and illogical approach to scientific problems.

It is fully appreciated by the writer that valid criticism is essential to progress and at all times should be welcomely received and openly solicited. Pseudo-scientific verbiage and empty theory, however, have no place and are not to be tolerated in any thinking group of investigators, and hypotheses are of little value unless supported by controlled experimentation. Dr. Horton's paper will be considered with this thought in mind.

The objections to the statements made by Dr. Horton will be made in the order in which they appear in the brochure.

1. To quote Dr. Horton: "I do not care for the term Negative Fusional Convergence when it is used to imply the diplopia point. The term has enjoyed wide usage. However, it appears to me that the use of the term abduction to imply the diplopia point as prisms are rotated base in is much more accurate. There is an unmistakable action of the accommodation in both the abduction and the adduction tests. The blur points or relative convergence points, both positive and negative, signify the termination of a purely fusional type of activity."

Answer. Negative and Positive Fusional Convergence are terms that have not only enjoyed wide usage but they convey to the practitioner a definite meaning whenever they are used. However, the objection offered to this terminology is quite untenable and incorrect in light of our present day knowledge concerning the operation of reflex mechanisms of convergence and accommodation. It is admittedly true that a blur of the object of regard occurs with the application of prisms bases in or out but this blur is not a *convergent* blur but an *accommodative* response to either a relaxation or stimulation of convergence. Prisms directly influence

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[1]Negative Fusional Convergence. H. S. Horton, Am. Jour. of Optom., Vol. 12, No. 4, pages 155-163, 1935.

the convergence, making it the predominant stimulus, with the accommodative action as the end-result of this stimulation or in terms of reflex activity, its response. Therefore, under the cited situation we find operating the convergent-accommodative reflex arc, which obviously does not affect the *fusional* convergence. That the resulting blur with base-out prisms is due to the accommodation can easily be demonstrated by adding minus lenses which immediately remove the indistinctness of the fixation object. We have in our possession experimental evidence to show that the only type of convergence present, when prismatic power is placed before the eyes, is that of *fusional* convergence, granting, of course, the constant existence of tonic reciprocal innervation, at all positions of the visual axes. Because of the presence of only one type of convergence, it doesn't appear that *fusional* convergence is an unscientific term to employ.

2. To quote: "At six meters I believe that our abduction finding gives the amount that the tonus pattern can be changed, the lateral recti becoming hypertonic, the medial recti becoming hypotonic. This test at the distance position thus gives us an estimate of the amount of elasticity which is present in the musculature, and shows beautifully the action of the phenomenon of reciprocal innervation. As the medial recti lose some of their tonicity, a similar amount is sent to the lateral recti."

Answer. At this point and other places in Dr. Horton's paper, there is an attempt to apply incorrectly, Sherrington's concept of reciprocal innervation. It is a neuro-physiological dictum that the tonus of opposing or antagonistic muscle groups is the same regardless of their length, size, or state of contraction and relaxation, under non-loaded conditions such as obtain with the eye muscles. Opposing muscle groups are *isotonic* under these conditions. Dr. Horton further states "that the increase in tension of one muscle is equal and concomitant with the decrease in tension of the other." The fallacy of this statement can be illustrated in the relative constancy of the phorias with different positions of the head in the horizontal plane (within, of course, the physiological limits). The fact that the phorias remain substantially constant demonstrates the isotonicity that is present. Any suggestion that a muscle is pulling tenaciously against its weaker opponent is contrary to incontrovertible neurophysiologic evidence.

3. To quote: "In regard to the results obtained in our orthoptic work, I can truthfully say that they are very high. Excluding strabismus and including not only convergence relaxation and convergence stimulation, but vertical correction as well, we are at least 95% successful. By that I mean that the patient is not only given a normal muscle and innervational balance, but negative and positive convergence amplitudes are made normal, and the patient comfortable."

Answer. The term "*Normal* muscle and innervational balance" is used in this connection in a meaningless and ambiguous fashion. If by "normal" is meant the ideal function or the best possible adaptation, then this viewpoint is questionable since it contains a subjective factor,

namely, opinions or ideals which differ from person to person. If, on the other hand, it is inferred that "normal" is the average or central tendency of a considerable number of cases, it is again open to criticism for the following reasons: It is possible and quite frequently the case, to find distributions of physiological measurements having the same average but differing markedly in their dispersive tendencies. Thus, it is quite logical to assume that averages in general have little significance unless we know the variability of the group we are dealing with. Most physiological mechanisms and psychological traits obey the normal probability curve which attaches considerable importance to individual differences. Our clinical studies have repeatedly emphasized the fact that high phoria imbalances (exophorias) at near, or low ductive powers are not necessarily criteria indicative of visual discomfort. It has been said that "Diversity is the most uniform thing in nature."

4. To quote: "Normals should be considered on an average as follows: 6 meters—abduction 8, adduction 40; ⅓ meter—abduction 26, adduction 40."

Answer. Dr. Horton fails to mention how he arrived at these so-called average values. How many subjects were used and what is the age range? What types of refractive errors were included, and what was the basis for this selection? Was the group representative and what was the index of reliability? What was the size and nature of the fixation object used at the distances mentioned? What intensity of illumination was employed? Were the prisms turned simultaneously over both eyes or was each eye duction measured separately?

A most careful survey of the literature has failed to disclose the source of Dr. Horton's experimental findings in the form of statistical treatment, interpretation and evaluation. For anyone to determine average values and then employ these numerical concepts as a standard to which every one must conform, if he is to have visual comfort, is speculative and marks empiricism in its rankest form.

5. To quote: "I feel that the two most effective instruments for myologic training were ignored in the investigative work reported by Dr. Tait."

Answer. To anyone who has read my report critically, it is perfectly obvious that this experiment was a preliminary investigation and that various orthoptic instruments were to be considered in succession. Besides, the subjects used were not in need of myologic treatment. To quote from my paper, "It was decided to employ the Kratometer in order to be consistent with the technique and methods suggested in the earlier studies." To evaluate the effectiveness of the various exercising devices will take several years of intensive research. We are gradually exhausting the possibilities of each and every piece of orthoptic apparatus so that our practitioners will receive from time to time, an unbiased and unprejudiced analysis of their possibilities. Merely because one *feels* that another instrument should have been used, is no reason that that par-

ticular piece of equipment deserves priority in an impartial investigation of this nature. It might be added that the two instruments suggested by Dr. Horton have yielded no better results than the Kratometer.

6. To quote: "I wish to comment on the selection of the subjects. I can find no fault with this, except that three of the four cases were cases which should not have been used in this investigation as they were cases of convergence insufficiency."

Answer. A careful observer would have noticed in reading the report that reference was made to the fact that the subjects were ocularly and physically normal. No subject was selected who had any asthenopic symptoms. All four cases were enjoying ocular comfort in every respect. Merely because they did not fit in with a set of highly questionable numerical constants is no valid reason to conclude that these subjects were abnormal or had inefficiently functioning ocular mechanisms.

7. To quote: "To pass back to the first case record, note that 17 treatments were given base in . . . etc."

Answer. Here again we find that Dr. Horton has committed an unpardonable error in his examination of the report. It is specifically stated that the subjects received four treatments per day which would total 68 and not 17 as Dr. Horton erroneously stated.

8. To quote: ". . . the concept of the operation of accommodative and fusional convergence is debatable. Dr. Edwin Tait has undoubtedly followed through investigative work before coming to this conclusion. I note that this concept was published in the American Journal of Psychology."

Answer. Dr. Horton questions Dr. Edwin Tait's work on the accommodative-convergence relationship. It is a perfectly natural and lawful action to have opinions. However, it seems that in full justice to Dr. Edwin Tait, it would have been more honorable if he had at least read the article, familiarized himself with the contents and then formulated an opinion based upon this scrutiny.

In addition it might be mentioned that the paper which appeared in the American Journal of Optometry by the writer was labeled "An Abridgement of the Material Presented Before the American Academy of Optometry at Baltimore, December 19, 1933." Accordingly, it might have been a better policy to have requested the complete report before qustioning the validity of the contribution.

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REPORT OF 500 CASES OF SUB-NORMAL VISION*

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Foreword

The writer wishes to acknowledge the intelligent co-operation of his assistants, Dr. Irving Vics and Dr. Henry J. Hoff, in all of the following work. They, together with our office assistant, Miss Amelie Gollinger, patiently persevered with many of the cases, even when they felt that little could be done for them. The success in some of our most difficult cases we owe directly to their youthful enthusiasm and resourcefulness.

We also wish to thank both Mr. F. L. G. Kollmorgen and Mr. E. O. Kollmorgen of the Kollmorgen Optical Corporation, who placed their scientific knowledge and splendid optical laboratories at our disposal.

We recognize in Mr. Moses Greenfield, our co-worker in the field of optical design, a young man of great promise, who has already done good work. We trust that we can continue to direct his native abilities in the physical sciences toward the field of optics.

None of this work could have been carried out if it had not been for the inspiration and encouragement all of our staff received from the many optometrists who displayed an interest in the work. We cannot mention them by name, except to say they number in the hundreds. We wish to thank them all.

We must, however, mention the deans of all of us, Drs. Hotaling and Ryer. To them and to Dr. Melvin, as members of the Committee on Sub-normal Vision, we express our gratitude. Their faith in the work of Visual Rehabilitation has ever encouraged us.

Introduction

Since 1910, with the introduction of Von Rohr's Telescopic Spectacles[1] optometrists and oculists have used these glasses in a number of cases. An examination of the literature since that date shows an

*An abridgement of the material presented before the American Academy of Optometry at Baltimore, December 18th, 1933.

occasional case report, with but few studies of any large number of cases.

The first series of cases reported were those in 1924 by Gradle & Stein.[2] They reported fifteen cases aided by the use of the 1.8x Spherical Telescopic Spectacle. Their report is analyzed statistically in Table I and Table II.

Gradle & Stein, in their examinations for Telescopic Spectacles, employed a Telescopic Trial Case, that consisted of a basic 1.8x telescope, to which could be added correction lenses on the eye-piece side and reading additions on the objective side. The correction lenses corresponded in diopters to the regular trial lens set. The reading additions ranged from plus 2 to plus 10. Thus, their magnifications for distance was limited to 1.8x and for near 4.5x (*i. e.*, 1.8x multiplied by 2.5x).

They stated their method of procedure as follows:

". . . After several determinations of the lenses required for the improvement of vision, a provisional T. S. is fitted by aid of the frame case, and the patient allowed to wear them for a few days, thereby obtaining an exact estimate of the effect of the selected combination." ". . . Practical experience has shown that in the majority of cases, spectacle wearers acquire within a few days ability of taking full advantage of the magnifying effect and that at the end of that period, they can see better than at first." ". . . After a few days the amblyopic patient accustoms himself to the enlarging effect of the telescopic combination, which makes objects appear very much closer, and in a short while, the patient will wear them consistently." ". . . Young patients will acustom themselves to the changes in a day or two, while with the older, it takes a longer time. It would be best to allow the patient to wear the provisional trial outfit at home and in familiar places, so that he will accustom himself to the changes more quickly and assuredly."

And further: ". . . There is one point we cannot impress too much. Time and patience by the physician, optician and patient are necessary." ". . . He (the patient) must try and try for hours and even a few weeks and after a while he will become accustomed to the changes produced and will see much better than at the first trial examination. Every patient we have fitted came back after a few days unable to see well with their Telescopic Spectacles." " . . . Again let us emphasize the necessity for perseverance on the part of the patient for weeks, as well as the necessity for the physician and optician to aid in such changes and adjustments as are necessary from time to time."

The next significant clinical reports in the literature are those of Leo L. Mayer.[3] [4] He reports in the first study ". . . of eighty-five eyes examined, 79, or 94%, were improved for distance." A statistical analysis of his reports is given in Table I and Table II. His technique for treating these cases is similar to that of Gradle & Stein, except that

in the second report he indicates that as far as possible, he has the patient buy the telescopes from the optician, as soon as it can be definitely demonstrated that a satisfactory improvement can be obtained. He adds in his conclusion, that: ". . . patience, care and even coercion are necessary to urge the patient to wear them." He further lists a number of rules for their use, the third of which is: ". . . The reading attachment must not focus print closer than eight inches."*

The next significant clinical report is that of the work of Abram B. Bruner.[5] He reports in detail a series of nineteen cases. His method of examination and procedure is similar to that of Gradle & Stein and Mayer. He says: ". . . Great care must be taken in making all frame measurements. Unless your experience in this line is considerable and your time unlimited, this would best be left to a competent optician." ". . . Final adjustment may only be successful after repeated readjustments and the exercise of great patience on the part of the patient, oculist and optician." And further: ". . . Having tested several hundred cases to date, a few general observations and impressions may be given, viz.: We seldom prescribe corrections for distance use." ". . . Practically all patients with poor visual acuity, who suggest the slightest hope of benefit, are tested in the office with telescopic lenses. Therefore, the percentage of correction is very small in comparison with the number actually tested."

A statistical analysis of his report is given in Tables I and II.

From the work quoted above and the analysis of Tables I and II, it appears that these men have found the 1.8x Spherical Telescopic Spectacle practical in 79 cases. These cases range in age from 8 to 87 years. Their cases were those having cataracts, retinal lesions, optic atrophies, myopic and choroidal atrophies, scars on corneas, physical anomalies, glaucoma, retinitis pigmentosa, amblyopic iridocyclitis and central chorio-retinitis.

The conclusions drawn from these reports may be summarized as follows:

(1) The increase in visual acuity is of frequent occurrence, but the device itself is limited in its practical use.

(2) Even in those cases where the limitations of the device do not prevent their use, other difficulties arise, viz.:
   (a) The lack of persistence on the part of the patient in adapting himself to the telescope.

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*In his first work, Mayer reports 65 cases. Unfortunately, the report is so worded as to prevent a statistical analysis or a basis for comparison with other reports. He speaks of 85 eyes as representing these 65 cases. He states: ". . . the increase in vision for near was as follows in 65 cases: To reading of ordinary small type newspaper print . . . 72% . . . ."

His report should be read in full to properly appreciate this excellent work. For analysis, we have included the ten cases reported in detail in this first report with the 35 cases in the second report.

(b) The frequent necessity of adjustment of the finished telescope by the optician.

(3) The patient who finally does adapt himself to the telescopes usually sees better after such adaptation than he did at first.

(4) The reading additions do not exceed plus 12.00 D., therefore the maximum near magnification is 5.4x.

(5) The work of examinations and prescribing is done by the doctor.

(6) The work of supplying and fitting the telescopes is left to the optician.

(7) The work of adapting the patient to the telescopes is left to the patient himself.

The above general method for treating a case of Sub-normal Vision is that which has been used by most practitioners and which, in our opinion, is directly responsible for the prevailing opinion that the possible use of Sub-normal devices is very limited.

STATISTICAL ANALYSIS OF REPORTS OF DIFFERENT WORKERS

Table I

	Feinbloom	Mayer	Brunner	Gradle & Stein
No. of Cases	298	45	19	15
Lens Involvement	23%	22%	22%	33%
Retinal or Choroidal	36%	34%	34%	49%
Optic Nerve	13%	15%	11%	5%
Cornea	11%	8%	11%	6%
Physical Anomalies	9%	13%	22%	6%
Glaucoma	8%	7%	0	0

Table II

	Feinbloom	Mayer	Brunner	Gradle & Stein
No. of cases aided by Spherical T. S.	166	45	19	15
Median of age distribution in group	60 years	63 years	39 years	45 years
Range of best V. A. with ordinary Rx found in group	20/1000 to 20/80	20/300 to 20/50	15/200 to 15/13	20/200 to 20/25
Maximum Magnification for distance (of T. S.)	2.2x	1.8x	1.8x	1.8x
Maximum Magnification obtained for near with reading addition	15x	5.4x	5.4x	4.5x

The present report concerns itself with a presentation of:

Part I. A Statistical Analysis of 500 Cases of Sub-normal Vision.

Part II. A Method for Treating Sub-normal Vision Cases, based on the Psychological Problems Associated with These Cases.

The following is a report of 500 cases of Sub-normal Vision. These cases are taken from our private office files and represent patients who came seeking visual aid.

These 500 cases were selected in the following manner: The first 500 record cards in the alphabetical files of the Sub-normal Vision cases were selected, omitting those who were totally blind or had only light perception. Thus, if a case demonstrated at either the first or subsequent visit that any measurable visual acuity existed, it was included.

Table III classifies the 500 cases into three groups:

Group A: Those cases who were aided visually and where the device was proven practical.

Group B: Those who were aided visually and where for reasons discussed below, the device was deemed impractical.

Group C: Those where no satisfactory visual improvement could be demonstrated.

ANALYSIS OF 500 CASES

Table III

Group	No. of Cases	% on Basis of 500
A (Aided)	298	59.5%
B (Aided but not practical)	105	21.0%
C (Not aided)	97	19.4%

A further analysis of Group A (the cases aided) is given in Tables I, II and IV.

In Table II are included only the 166 cases that were aided with Spherical Telescopes. Thus, they may be compared with the cases of the previous reports.

Tables I and IV include the entire Group "A" of 298 cases.

Table IV analyzes Group "A," showing the number and percentage of that group who were aided by a particular device.

Table IV

No. of Cases	% of Total	Device Used
104	35%	2.2x Sph. T. S.
46	15%	1.8x Sph. T. S.
16	5%	1.5x Sph. T. S.
63	21%	Cyl. T. S.
35	12%	Microscopic Sp.
22	7%	Pin Hole Spec.
12	4%	Contact Lenses
Total 298		

Care must be taken in interpreting the classifications. For example, it frequently happened that a patient had a retinal and a lens or corneal involvement. In some such cases it was found that the Telescopic Spectacle and the Pin Hole Spectacle would aid equally well. In most of these cases, only one device was finally selected, although in some cases two or three devices were supplied, *e. g.*, a Spherical Telescopic Spectacle for reading, a Pin Hole Spectacle for outdoors on bright, sunny days and a Cylinder Telescope for outdoors on cloudy or dull days. That device which furnished the major usefulness to the patient was used as a basis for classifying the case in these instances. Every case of this kind is counted only once in the series.

Similarly, the percentages given for the various Spherical Telescopic Spectacles used must be interpreted with care. In almost all cases where the 1.5x and 1.8x increased vision, the 2.2x increased it still further. However, we have tried in any given case to use that system which best serves as a compromise between the most distance vision, the greatest working or reading range and the largest field of vision obtainable.

Through the consideration of the theoretical optical factors involved in using the Telescopic Spectacles for reading, we developed two new devices which permitted a further degree of choice for the near corrections.

The first of these devices we term the Compound Reading Addition,[6] which enables an increase in the magnification of the 2.2x Telescopic Spectacle for near up to 15x.

The second of these devices we term the Microscopic Spectacle,[6] which is a spectacle suitable for near vision only and has a range in magnification of from 10x to 18x.

Thus, some patients could be aided equally with a 2.2x Telescopic Spectacle combined with a compound reading addition, as with a Microscopic Spectacle. Here again, the final selections depended upon the individual requirements. In some cases both the Telescopic Spectacle and Microscopic Spectacles were used; the case was then classified according to the device most used by the patient.

Each such case was counted only once in the series.

In Group "A" are included only those cases where the pathology has ceased or has become stationary, so that no further medical or surgical aid is indicated.

In Group "B" are included cases where:

1. The pathology had not been arrested and further medical or surgical aid is indicated.
2. The physical or mental health of the patient was such that it seemed inadvisable to put him through the adaptation treatment.
3. The field of vision was so contracted that any demonstrated

increase in visual acuity would be of no practical benefit to the patient.

Part 2—A Method for Treating Sub-normal Vision Cases, Based on the Psychological Problems Associated with These Cases.

The method we have evolved for treating cases of Sub-normal Vision resulted from the appreciation of the facts that:

First: Every Sub-normal Vision case requires a period of adaptation before he can properly use the necessary device.

Second: Many patients show a definite resistance to undertaking or carrying out this adaptation.

Third: This resistance is due, not to the limitations of the device itself, as was previously thought, but to the presence of psychological problems superimposed on the visual ones.

In the first place, since a difficult problem of adaptation or learning existed, it seemed advisable to conduct this learning process under the direction of the doctor, rather than the patient. We definitely adopted the procedure that the patient must do all his learning under our personal supervision.

We discovered that the properties of the old 1.8x Spherical Telescopic Spectacle were such that they did prevent their application to certain cases. (This led to the design of the Cylinder Telescopic Spectacle, the 2.2x Telescopic Spectacle, the 1.7x Wide Angle Telescopic Spectacle, the Microscopic Spectacle and numerous variations of Pin Hole Spectacles.) [6]

However, we found that in those instances where the 1.8x Telescopic Spectacle was entirely satisfactory as to magnification, field, etc., this resistance existed equally well. We may add here that the resistance as such is scarcely ever caused by the limitations of the device, as it is by certain psychological conditions.

The reason for this period of adaptation is that the patient must learn new habits of co-ordination in order to be able to use the device properly. For example: A person with normal vision has a certain degree of head movement, together with eye movements when reading; he has a certain "reading span," a certain "reading rate," a certain "reading field," etc. All of these factors must be changed when using a device before the eyes. In order to change them the patient must understand the new requirements and learn to incorporate them into new habits. For example: He must learn to move the paper rather than his head; reduce his reading span to single words, or even letters, at times; increase his speed of perception; compensate for a lack of depth of focus by keeping the reading material at a fixed plane; learn to utilize sufficient and proper illumination, etc.

Besides learning these new motor co-ordination habits, the patient frequently must re-learn or acquire for the first time certain visual habits. We have pointed out in an earlier paper[7] that such cases have

their memory pictures for words and many objects dulled or blotted out; how in some congenital cases of Sub-normal Vision these memory pictures are never formed.

We believe it is the formation of these new visual memory pictures that explains the almost universal improvement in vision that results both with and without the device after the device has been used for a time.

During the learning period the device is used only in the office. The conditions during the office visit are changed constantly by trying different devices and by changes in the illumination factors. A record is kept of the illumination required on the printed page. This usually varies from 30 to 300 foot candles. In cases of media involvements not only must the intensity be sufficient but it must be properly shielded to prevent scattering effects within the eye. This is done by the use of either a reading shield on the paper, or side shields on the device.

This period offers an opportunity to study the visual habits of the patients. These habits are frequently different from normal ones and require changes in the design of the standard devices. One only appreciates the importance of these changes in the design after they have been made.

Thus, some patients because of difficulty in central fixation find they see better if they turn their eyes somewhat to the side (eccentric fixation). Whereas at first we simply changed the position of the telescope, we now change the size of the eye-piece of the telescope. Other patients claim they see and feel better if the glasses are placed very close to the eyes. To accomplish this we often cut their eyelashes. In other instances, the Cylinder Telescopic Spectacle may be found to be more acceptable with the maximum magnification vertical instead of horizontal. Almost always, some modification must be made in the Pin Hole Spectacles. The size of the openings or their distance apart, or their pattern, or their number, may have to be changed.

The adaptation period, then, serves as an experimental one as well. Any original designs that are needed can be carried out and tried.

In order to understand our contention that many of these cases who can be aided visually resist this aid, it is necessary to consider these cases from the point of view of recency of onset, or the duration of their Sub-normal Vision. The term recency is here used, not only in its temporal sense, but its psychological one. Thus, a patient may have lost her vision ten years ago and yet regard this loss as though it had happened just a little while ago. This is frequently met with in psychic traumas, and many of the Sub-normal Vision cases must be classed with these.

The cases naturally fall into three groups: The first are those who have had normal sight up to a short time ago. The second are those who originally had good vision, but now have had poor vision for a long time—five, ten, or fifteen years. The third group contains

those who were born with Sub-normal Vision or acquired it at an early age.

Many of the patients in the first group—those who have suffered loss of vison recently—are governed in their every attitude by the definite psychological fear of blindness. These are cases which have been treated medically until the pathology has been arrested, yet they constantly worry over their imminent blindness because they have been told that nothing further can be done.

With this fear of blindness ever in mind, it is impossible for them to be greatly concerned with anything that improves their vision but does not cure their eyes. Added to this difficulty is the usual advice they have received of "saving their vision." For some strange reason, it is commonly held that eyes that have once been pathologically involved are not to be used to their capacity, but rather that they are to be "saved." We can only ask, "Saved for what?"

The patients may not mention this fear of blindness directly, but evidence it indirectly. For instance: They want to know will not their eyes become worse if they use the device; will they ever really be able to see better; will they really see well enough to walk or work with the device; will not they become so dependent on the device that they cannot do without it; will they be able to read small print; will they be able to read rapidly, etc. If one should answer these doubts, they return with others. Basically, they are concerned not with the workings of the device but with the question of blindness.

It therefore becomes imperative in these cases, after demonstrating the possibility of visual improvement, to definitely assure them that blindness is not imminent. The psychological attitude indicated here is to allay their fears by not only assuring them that blindness is not likely to occur, but asserting that by sufficient adherence on their part to the immediate work of adapting themselves to the device their visual responses may improve. Every effort must be made to turn their interests to those channels where their vision is sufficient for their needs. Thus, in place of this fear we attempt to substitute a program of work destined to aid them.

In the second group, those who have had their condition for a long time, are found many patients who have developed such complacency and have so satisfactorily adapted themselves that they resist any attempt at change in their vision.

These patients are usually brought by other members of the family who are far more anxious for some improvement than the patients themselves. These are patients who have difficulty in getting about because of a lowered visual acuity or restricted field; who have not read print or visited the theatre or moving pictures for many years. They have learned to use their affliction as a means of commanding interest from the other members of their family. They have long since given up hope of any change and tend to magnify their difficulties.

Their attitude during the examination is one of indifference or passiveness. When asked to read letters on the chart they do up to a certain line and then stop. When told to continue they say they cannot see the letters. It is amazing to note that when they are then told that it is not necessary to "see" them, but merely to "read" them, they calmly read another line and again stop. This sometimes continues until they have indicated a visual acuity of 100% better than when they first ceased "seeing." This may occur either with or without a device before their eyes.

The psychological approach toward this type must be one that will not disturb their complacency too rapidly. Even though the members of the family are delighted with the improvement obtained during the first examination and the even greater improvement that usually follows after each succeeding visit, the attitude of the doctor towards the patient should be one that minimizes the effect. The patient should be assured that what they are now doing in demonstrating these improvements is simply a natural consequence of the use of the device. They are told that they are still far removed from the goal they must attain, that they need not exert themselves, the improvement will be very gradual.

In analyzing such patients privately, away from the other members of the family, one learns of the constant unconscious conflict that exists between patient and family.

In treating this type visually, they are permitted to read from specially selected books that have large print. Thus they require only a low magnification in their device and so find it easier to adapt themselves. Then we select print somewhat smaller, then magazine print, and finally newspaper print.

All this time everything is done to make the patient feel that their improvement is a logical consequence of the treatment and not anything that either the doctor or family has forced upon them.

Thus, in place of the original hopelessness of the condition, with its attending complexes, we substitute a program of visual work that makes them more confident and hopeful.

In all this work, we can as yet do nothing to increase their restricted fields. Any difficulty resulting from this cause remains. However, by improving their central visual acuity so as to see better those things they saw poorly before, we encourage them in their feeling of self-reliance.

The third group consists of those who were born with their anomaly or who have acquired it early in life. Many of the cases in this group may be divided into two classes: One, those cases who have at some time or other attended a school for the blind; and second, those who have obtained some visual instruction by themselves and have never attended such institutions.

It should be clearly borne in mind that nothing herein is meant

as a criticism of such institutions. Rather should our profession be censored for not having cared for those children, whose unaided eyes are too poor to attend the regular schools and yet have sufficient vision so that they can be satisfactorily aided by some optical device other than ordinary glasses.

Cutsforth[8] presents an excellent psychological study of the blind. Many of the problems of behavior and adaptation to environment found in the blind are intensified in these near blind or Sub-normal Vision cases.

The training of the partially blind in the methods of the blind produces an anachronism—one who can never truly enter into the "spirit" of being blind, and yet who is visually useless. We have not had opportunity to study many such cases, because when once they are trained as blind people they seldom seek further aid; nor do they readily accept any visual aid even when it is demonstrated. The satisfactory results we have obtained in those few cases we have worked with convince us that a field exists here for this type of work.

In contrast to these "blind trained" Sub-normal cases, exist those where the individuals have not had such training. This second class have visual acuity equally as low as the first class. Many of them have such visual acuities that any attempt at their measurement is well nigh impossible. Some of these cases have eyes with moderately restricted fields of vision, no measurable central vision and still get about alone, carry on work that does not require detail discrimination, have learned their alphabet, learned to read simple words and are, in the language of one patient, "A crippled seeing person, but not a blind one."

This second class seems to have replaced the conception of detail discrimination or visual acuity with one of shades, shadows and memory. To see them tell time on an ordinary sized watch dial would make one feel certain that they had fair vision. Yet, when we realize that every moment of their lives is expended in learning to compensate or adapt themselves, it is simple to understand that they intuitively learn to tell time. They tell time not by seeing the numbers but by first knowing what time it is every minute of the day and then by confirming this certain knowledge by a quick glance at the shadows of the two arms of the watch.

These patients recount what appears as the most amazing visual feats. They recognize people a block or more away; notice the slightest re-arrangement of articles in a room or on a table. They move about in the busiest traffic and make every effort to behave as seeing people. An analysis of each of these visual performances, however, soon shows them to be everything but visual.

When it comes to treating these two classes, we find the first lacking in any assurance in their responses. They lack visual experience and visual expression. Most of them must be taught the letters of the alphabet, or numbers, before any satisfactory determination of visual

acuity can be made. We can only describe the labor necessary to carry such a case to a successful conclusion, by saying that it takes an infinitude of patience and endless time. Of course, some of these cases respond more readily, but at best, they should never be undertaken unless the doctor is prepared to complete the necessary work.

Treating the second class of this group simply requires that we follow the directions of the patient. This class of patient has taught us more of the true requirements of the Sub-normal Vision case than we have evolved ourselves through a consideration of the normal functioning of the eyes. These are the patients who have obtained for themselves, often against the advice of their doctors, some type of magnifying glass or pin hole, or opera or field glass, or some form of occluding shield. They literally come offering suggestions to be incorporated in some device, suggestions that the doctor always overlooks because be is too busy with the pathological diagnosis to even listen.

This class progresses very rapidly and there is little work that the doctor need do. We have found it worthwhile to let the patient treat us rather than we treating him.

Conclusions

As the result of the use of several newly developed devices, together with those already known, and an appreciation of the physiological and psychological problems associated with their use, we have found it possible to rehabilitate approximately 60% of a group of unselected cases of Sub-normal Vision.

We feel this figure should hold for the next 500 cases, provided the frequency distribution of the causes for the Sub-normal Vision and the ages of the patients remain about the same.

We believe the work to date has opened the field for the development of more optical devices. We believe we have made radical changes in the appearance of these devices so that they look more presentable.

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SOME FIRST EXPERIENCES WITH OPTOMETRISTS

At the age of forty-two I consulted a man in the sixties because I felt at that time that my eyes needed some assistance. My eyes, I knew, were not bad, nor was my vision very subnormal, but I did think that perhaps glasses would be beneficial to me.

He was a kindly gentleman, enthusiastic about the value of optometry. His office was neat but drab. It contained an old desk, an old book case, several chairs and some testing equipment. My impression from these observations was that he had not made much of a living at his profession, in spite of the fact that he was one of three of the professional optometrists in the city of 40,000 in which he lived and seemed to be generally liked and respected as a citizen.

To get my history he asked very few questions, and he gave me no great examination. He tested my vision, looked into my eyes with some small electrical instrument and then tried on a number of different lenses to see which I could use. This examination, however, took a long time because he stopped so often to tell me about the trouble his married

daughter, a girl I had known in school, was having with her husband's family.

His instructions were to rest my eyes as much as possible and to use the glasses he prescribed for reading only. I asked him what he thought was causing the difficulty and he said something about "muscular exhaustion" which meant nothing to me and I am sure, nothing to him also.

The following year I consulted a woman optometrist, as I was never quite satisfied with the previous work. This doctor was a large woman and looked very efficient. She, however, was very blunt and had little or no sense of humor. Her office was very attractive, airy and light, and in every way immaculate.

She asked many questions about my health and eyes, writing comments on a card as I replied. Her examination was very thorough, taking nearly an hour on each of two visits and her conclusion was that I had some sort of an involvement of the muscles that had to do with turning the eyes in the orbits. She advised me to continue using my glasses but to take treatments three times a week for at least a month. I then took six treatments.

As a result, I obtained immediate relief. My eyes feeling better than they had in years, and I would have continued had I felt differently toward the doctor herself. Very frequently she addressed me in the tone and manner of an army officer when I failed to hold the lights to suit her.

Also, I had the feeling that she regarded my feeble attempts at joking with her as evidence that I did not take her optometry nor my own visual problems seriously. She seemed to try to scare me into being more careful of my health and my eyes. She did succeed in scaring me into going to another doctor to find out just what I must do to conserve my vision in the future. She appeared to lack even average sensitivity and sense of humor. I was glad to escape from a well-meaning but irritating personality.

I hoped my next experience with an optometrist would be an agreeable combination of the best points of the two I have mentioned. It was. I was first impressed by my new doctor's office. It was clean and well arranged. There was up-to-date literature in the reception room and I appreciated the absence of cigarette odor. An examining room, a treatment room and a laboratory suggested that he had quite a practice. I was favorably impressed by the equipment he had and wondered what he did for patients besides giving what I thought of as optometric service.

His secretary struck me as dignified, refined and very alert in anticipating his needs. I was surprised that he asked very few questions. I found it easy to talk to him, and as a result I volunteered more information than I might have done otherwise. He seemed to sense my difficulty.

During his examination I was impressed with his skill in using his instruments and the smoothness by which the examination developed. I

went away wondering whether he regarded my condition as serious. He made an appointment for me for the following day on which several new tests were made and several of the tests made on the previous day were repeated. He then made no promise to cure me, but I retained my confidence in him because of his thoroughness and his sensible explanations of my visual condition.

I was much pleased by the relief I received under his care, and I shall return to him next spring as he suggested.

Among the qualities I consider essential in a doctor are these: Skill in his specialty, dignity, personal cleanliness, business-like use of time, interest in his profession, thoroughness in reaching a proper diagnosis, ability to talk pleasantly and keep on working at the same time, honesty with his patients, both in the matter of his work and in making bills consistent with the circumstances of the patient, a sense of humor and a sensitivity which enables him to understand the patient's point of view and state of feeling before it has been expressed in words. In other words, the ability to keep the relations between the doctor and patient as friendly as possible.

So ends this quotation from this patient's letter. It seems to me that the first visit of each new patient is the most important and most critical in all his relations with the optometrist. If the patient is impressed with a neat office, an intelligent history taking, a thorough examination followed by concise explanation and instruction by an optometrist who has developed the sort of personality described above, the future relations between the patient and doctor should be of the best.

C. C. K.